

chemical burns; 21% from acute intoxications; and 42.4% included other skin ailments. Females are about 15 (range 11-24) times more likely to develop chronic irritations of the hand and feet than males. Males are about 2 (range 1-6) times more likely to get acutely intoxicated than females. Young males are more likely than old males to suffer from acute intoxications as well as chemical burns.

*Conclusions:* The incidence of acute pesticide injuries is still very high in Costa Rica, a country that has probably the best record in Central America in pesticide-injury prevention. It is important to promote research in the areas of worker protection and alternative pest management that are adequate to developing countries from the climatic, cultural, and economic perspectives. Future research should identify the needs of subgroups of worker population to correct occupational health problems through effective training and law enforcement.

#### **Distribution of Worker Deaths Related to Grain Handling—1985-1988**

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*Objectives:* To describe grain-handling fatalities on U.S. farms by external cause of death so that intervention efforts may be appropriately focused.

*Methods:* For the period 1985-1988, the National Traumatic Occupational Fatality database maintained by the National Institute for Occupational Safety and Health (NIOSH) was reviewed to identify deaths associated with grain and forage handling among people aged

> 16 years from the agriculture, forestry, and fishing industry classification who met the case definition of fatality at work. External causes of death were determined from death-certificate injury descriptions. Similar causes (e.g., suffocation under different grain types) were grouped, resulting in a total of 26 groups. Tractor rollovers were not included because tractors are used for activities other than grain handling.

*Results:* Suffocation under grain and forage or in storage structures, auger entanglements, falls from machines or structures, and electrocutions from machinery contacting overhead power lines accounted for 55% of the 202 grain-handling fatalities examined. The remaining 45% of the deaths were partitioned among 22 other groups, with none individually contributing more than 5%. Seventy percent of the suffocation fatalities, which accounted for 20% of the total grain-handling deaths, were due to being buried under grain or forage. Auger entanglements and falls each accounted for 12% of the total fatalities. Eighty-four percent of the falls were from structures. Descriptive worker demographics were determined.

*Conclusions:* The hazards associated with structures, augers, and machinery contacting overhead power lines are the leading external causes of death directly attributable to grain-handling activities. Although they have been addressed in various safety literature in the past, these hazards continue to cause farm fatalities. Knowledge of how grain-handling fatalities occur will help to identify priorities for continued intervention.

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*Abstracts*



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# **ABSTRACTS**

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